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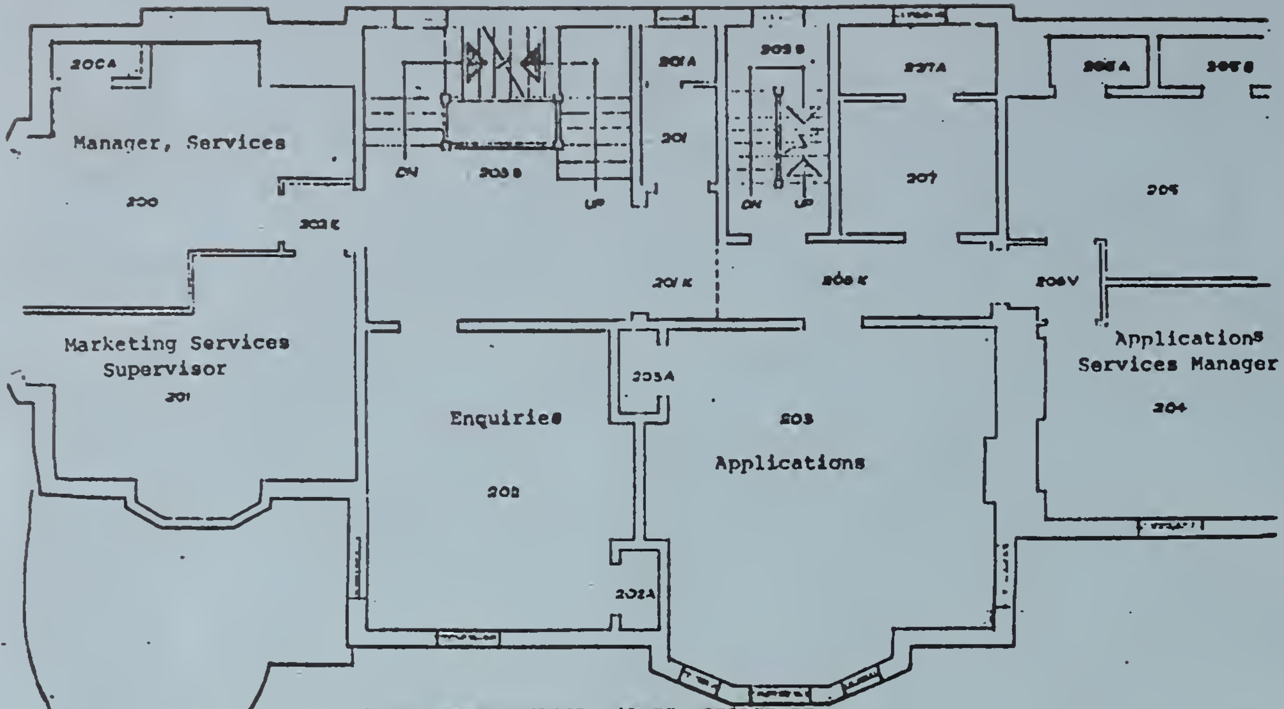

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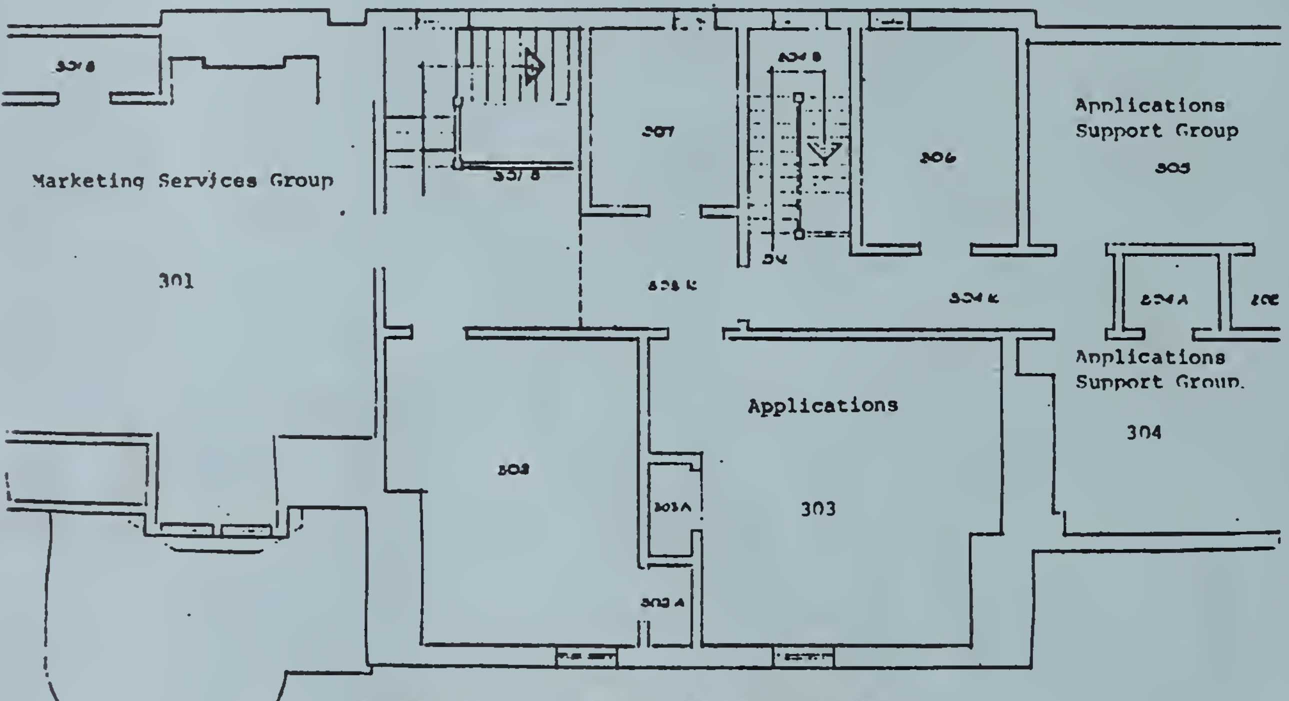

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COMPUTERNEWS is a monthly publication produced by the University of Toronto Computer Centre. Enquiries or contributions should be directed to the Editor, Janet Campbell or the Assistant Editors, Margo Harvie and Ruth Borenstein in the Sandford Fleming Building room SF125 or (416)-928-2066. Layout and ATS typing are provided by Lynne Jenkins. Subscription changes should be directed to the Information Office, Sandford Fleming Building room SF128 or (416)-928-4990.

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EDUCATION SCHEDULE

Following is a list of courses to be offered by UTCC. Please note that with the exception of the Introduction to Computers Course all courses require the user to hold, or have access to a Customer Account Number.

Introduction to Computers

Prerequisite:	None
Dates:	Oct. 15, 17, 21
Time:	4 - 6 p.m.
Instructor:	W. Cowan
Location:	Sandford Fleming, Room 126

This course is for people who have had little, if any, contact with computer programming. It is recommended as a prerequisite for any non-programmer intending to take an introductory course in any language during this schedule or at a later date. The course will cover the basis of inputting and outputting information to and from the computer as well as how information is stored and processed.

Introduction to Job Control Language (JCL)

Prerequisite:	Must hold a CAN; knowledge of and experience in using a programming language.
Dates:	Oct. 14, 16, 20, 22, 24
Time:	4 - 5 p.m.
Instructor:	K. Fysh

Job Control Language is the programmer's means of giving instructions and information to the Operating System. Through JCL, requests are made (e.g. memory allocation), information is given to the system (e.g. accounting and class information) and datasets are manipulated. This course is intended to present the basic statements of JCL and explain their uses. The student will be expected to test his knowledge by using JCL to access and manipulate datasets placed on the system by the instructor.

Basic Utilities

Prerequisite:	Introduction to Data Processing. A basic knowledge of JCL is advantageous. Note: the JCL and Utilities courses should not be taken simultaneously as there is some overlap.
Dates:	Oct. 14, 16, 20, 22, 24
Time:	5 - 6 p.m.
Instructor:	S. Pozgaj

The course will provide a survey of the basic utilities most often used to list datasets, to move and backup datasets and to create and manipulate datasets. The course will be of interest to those people who are starting to use direct access devices for the storage of their data. The utilities surveyed will include the basic UTCC dataset allocation utilities and the IBM utilities associated with dataset usage.

The student will be able to create and use datasets on the system with these utilities and then manipulate those datasets. Access to the system will be provided through the course.

cont'd...

EDUCATION SCHEDULE Cont'd.

Introduction to Plotting

Prerequisite: Must hold a CAN. It is advantageous to know a computing language.
Dates: Oct. 27, 29, 31
Time: 4 - 6 p.m.
Instructor: W. Cowan

The course will cover the basics of plotting on the Gould/Calcomp plotters. By completion of the course the student should be able to produce simple plots and graphs on the Gould plotter.

Datasets and Dataset Manipulation

Prerequisite: Must hold a CAN; basic knowledge of JCL.
Dates: Oct. 28, 30 and Nov. 3
Time: 4 - 6 p.m.
Instructor: K. Fysh

An explanation of dataset types and their uses. Practice in manipulating various datasets.

See SUPPLEMENT for Registration Form for Non-Credit Short Courses.

SPEAKEASY SESSIONS: THE CONFERENCE

While for most SHARE XLV attendees the convention atmosphere started Sunday evening in New York, for many SPEAKEASY people it began Thursday evening in Chicago, site of Argonne National Laboratories and home of SPEAKEASY. The third annual SPEAKEASY Conference was held August 15 and 16 at Argonne. The Conference was informal, with only one session being held at a time. The main announcements were the new release (LAMBDA) and a revision of the new TEKTRONIX package. The LAMBDA release features a new program editor, a faster link facilitiy, recovery from most ABENDs, improved differential equation and statistical routines, character manipulation and 3-D graphics (in the 'old' Tektronics package). The new EDITor combines the old EDITor syntax, some of the TSO EDITor, plus several new features including the ability to undo the last change you made! LAMBDA is scheduled for availability around the end of the year. An incomplete version has been obtained which is now being tested. Users should continue to use KAPPA until LAMBDA is released.

The revised version of the 'new' Tektronics package, the product of John Reynolds at COMSAT, has several enhancements. After seeing it, most conferees agreed that it should become the standard for other graphics packages (such as CALCOMP). This new version should be available by the time this article appears in COMPUTERNEWS. Contact Ian Darwin for further information.

Sessions were also held on Text Processing, Data Base Management, Language Standards, SPEAKEASY on CMS, MTS and the PDP-10, new statistical routines, SPEAKEASY at the Federal Reserve Board, writing a LINKULE (adding a new function to the language) and an open discussion of the future of SPEAKEASY. Papers from many of the sessions are available. Users interested in one of these topics should contact Ian Darwin at 928-7318.

After the last session a few late leavers got a quick tour of the windy city, then adjourned to a Greek restaurant and tavern from which, after consuming riotous amounts of food and beverage, people were observed to wander off into the night in the general direction of SHARE.

Ian Darwin

SHARE XLV

A number of UTCC staff members attended the SHARE XLV Conference which took place in late August in New York City. SHARE is a non-profit organization of IBM users which meets twice a year and attracts wide representation from American and Canadian installations. During the SHARE Conference, technical and management information is exchanged, educational sessions are presented and resolutions on matters of concern to users are prepared by the various divisions of SHARE for consideration by IBM.

cont'd...

SHARE XLV Cont'd.

UTCC representatives participated in sessions in all of the Administrative, Basic System, Database/Data Communications Applied Systems, Integrated Systems, Language, Management and Support Services Divisions of SHARE. In addition UTCC staff were directly involved in organizing sessions on Operational Organization, Self-Service, Concerns of Canadian Users, Mass Storage Systems, and Marketing to Computer Users. Articles describing the UTCC presentations appear elsewhere in this issue of COMPUTERNEWS.

Session Synopses

IBM has recently reorganized its corporate structure and its new face was clearly seen at SHARE. The System Development Division, formerly responsible for System Control Programming such as MVS or VS1, has been eliminated. In the new IBM structure, the Data Processing Products Group coordinates new product design and strategy for the System Communications Division, System Products Division and General Products Division. At the New York Conference, SHARE was considering restructuring itself along the new IBM lines.

In the session entitled 'The Future of Data Processing Technology', R.M. King of the IBM Data Processing Products Group emphasized IBM's desire to increase the role of computers in the administrative divisions of companies, where he maintained computers could be particularly cost effective.

Asserted was IBM's commitment to better the operational characteristics of computer systems by improving reliability and ease of maintenance, and providing unified software packages. In VS2 Release 4, IBM's goal is to lower the defect rate to one or two errors per thousand lines of code. Looking forward, King said that rigid interfaces between the data management, control, processing and communications components will be introduced into operating systems to reduce complexity and facilitate maintenance. Structured programming, top-down design and code inspections are to become mandatory parts of the IBM programming development process.

King saw a continued strong trend toward an improved price-to-performance ratio. He pointed out that a key question still to be resolved is whether centralization of data processing operations should continue to be a goal. With intelligent terminals and mini-computers playing larger roles, the centralization issue may have to be re-examined.

IBM has accepted a SHARE resolution calling for the introduction of a high-performance, limited-function time-sharing system. Although IBM's announcement of the system has not been made officially at the time of writing, details of the 'proposed' system discussed at SHARE can be reported. The system will run under DOS/VS, VS1 and VS2, using VTAM for terminal control. It will act as host for new APL, BASIC and interactive FORTRAN interpreters, as well as job submission and editing facilities. SHARE is already submitting resolutions for extensions to the system.

cont'd...

SHARE XLV Cont'd.

At a SHARE meeting one year ago, IBM announced a 'language stabilization policy', which stated that no enhancements were planned in the next few years to IBM's PL/I, FORTRAN and COBOL compilers, except when required by the ANSII Standard's activities. At the New York meeting, the position was revised. IBM is now receptive to suggestions for useful enhancements to these compilers. UTCC can forward user suggestions locally or through SHARE to IBM management.

Considerable interest in VS2 Release 2 and 3 user experiences was again experienced at SHARE. Several installations are running MVS, IBM's latest virtual operating system and many are planning implementation. IBM showed an awareness of the MVS performance problem at SHARE. Major efforts are underway towards reducing memory requirements, permitting the control of performance tradeoffs and providing better accounting tools. UTCC MVS experiences were again of interest to other installations.

Much SHARE time is devoted to technical discussions. Some of the sessions which were of interest to UTCC staff were: 'Brand X Software Experiences', 'Front-End Processing Topics', 'Virtual Machine Experiences', 'Getting Good Program Support from IBM', 'APL Working Sessions', 'Improving TSO Performance', 'A Comparison of TSO Editors' and 'RLS, the Rand Compiler for PL/S'. There were also sessions of interest to operational management and user support personnel.

Further information on topics discussed at SHARE XLV can be obtained from appropriate UTCC staff members.

Don Brady

MORE FROM SHARE XLV

One of the most interesting sessions that took place at SHARE XLV was a series on a CALL-360 replacement or "follow-on" system, a new terminal system which has not yet been formally announced.

CALL-360 is a limited function high-performance terminal timesharing system, similar but superior to CPS. It is anticipated that the to-be-announced system will include versions of APL and ATMS (the latter is IBM's replacement for ATS/360) as well as improved versions of CALL-360's interactive PL/1, BASIC and FORTRAN. Such a system would not provide all the facilities of TSO, but would provide a large subset of those facilities together with better response time, at a lower cost.

Another session of interest was the one on ATMS experience. Most users seemed to consider ATMS an acceptable upgrade (ATS/360 is no longer supported by IBM nor does it run under VS without modifications) though there were questions of response time, deriving from ATMS' reliance upon CICS (Customer Information Control Systems). CICS is a system with a purpose similar to that of the IMS system which UTCC runs on the S/370-155-II.

For TSO users, there was a session on full-screen programming of the IBM 3270 under TSO. Since UTCC does not run any 3270's on

Cont'...

MORE FROM SHARE XLV Cont'd.

TSO, this session was of interest for planning purposes only.

Of note was a presentation on IBM work in graphics. Not surprisingly, IBM has realized that 'real' graphics requires dedicated intelligence; the custom-built systems described, involved dedicated remote System/7 with 2250 devices. The systems seemed adequate, if perhaps a little expensive for the average user. The graphics film fest was interesting.

The Documentation and Standards group (formerly the Publications Project) held several sessions. One open session on text processing and online documentation was attended both by persons with no experience in this field and by large users equal to UTCC. The main drawback to online documentation for some places was the cost of online storage. Other installations felt that the value to the user outweighs this cost.

Anyone interested in discussing these sessions in more detail, should contact Ian Darwin at 928-7318 or at 49 St. George St., Room 303.

Ian Darwin

ADCIS SUMMER CONFERENCE PROCEEDINGS

Portland, Maine-August 4 - August 7, 1975

The Association for Development of Computer-Based Instructional Systems (ADCIS) is an international, non-profit organization with members throughout the U.S., Canada and Europe representing elementary and secondary schools, universities, business and industry, as well as government agencies. The University of Toronto is an institutional member of the Association and has voting priviledges.

The purposes of this organization are to:

1. Advance the investigation and utilization of Computer-Based Instruction (CAI) and Computer-Managed Instruction (CMI)
2. Promote and facilitate the interchange of information, programs and materials
3. Reduce redundant effort among developers
4. Specify requirements and priorities for hardware and software development in the educational field

Most interest and discussion at the conference was on the PLATO terminal system; however, nearly any CAI/CMI activity can be discussed within ADCIS and many topics were touched on.

It may be of interest that HENUG (Health Education User's Group) is now marketing the health network facilities since the withdrawal of federal funding. There seems to be no comparable network of data acquisition and sharing facilities available to Canadian hospitals and clinics.

CAI, based on the PLATO system, is evidently now old enough that experienced users treat it with some circumspection. Problems were found in stabilizing lessons against revision by authors and also in the lack of both authors and lessons. Knowledgeable reports attested to the difficulty of integrating CAI/CMI with the educational objectives of educators.

Cont'd...

PROCEEDINGS Cont'd.

On the one hand, it was generally agreed that development of CAI lessons should not be entrusted to computer programmers. On the other hand, an intelligible interface must be provided to the very sophisticated technology required to present an educator with the materials he asks for: audio/video support, graphics capabilities, CAI/CMI and convenient course-writer languages that make all all these elements addressable. In effect, an educator wants the support technology that would enable him to transfer his very best presentation and conception of his course materials to a permanent record.

PLATO, as a multi-media device, has been very successful that way, but requires large, dedicated CPU's to support the PLATO terminal with a minimum of 400 terminal connections to become in some sense cost effective.

It has been found that CAI activities open up entirely new areas for computer access: to departments of music, foreign languages, biology, law, medicine, etc., and generally, CAI activities spark industrial and community interests in such areas as rehabilitation, job re-training, skill update and development wherever CAI is supported.

Despite (or perhaps because of) the success of PLATO in the U.S., the National Research Council of Canada has developed it's own program for CAI that is at least as comprehensive as PLATO, including an implementation language and operating system capable of running on large mini-computers such as the DEC-10 under standard monitors, an author language "NATAL-74" and a variety of terminal interfaces, including a plasma-like terminal.

Computer Centres currently involved with this project are:

Calgary, University of Calgary
Hamilton, McMaster University
London, University of Western Ontario
Ottawa, Carleton University, Algonquin College
Montreal, University of Montreal
Toronto, Ontario Institute for Studies in Education

It is expected that the NRC project will be fully enabled by mid-1976. In any case, judging from the experience of the PLATO project, the development of courseware suitable to the Canadian educational environment will also be a major project, necessarily carried out within the jurisdictions of each province.

Stemming from my conversations with Jack Brahan of the NRC at the ADCIS Meeting, I have the following publications and references to the project:

W.L. Honey, W.C. Brown and J. Brahan, The Computer-Aided Learning Program at the National Research Council of Canada, NRC

J.W. Brahan and J.G. Cossalter, OPSTS-Specialized Time Sharing within a General-Purpose Time-Sharing System, NRC

NRC, Computer-Aided Learning, "Learning Systems, Second Phase"

NRC, Computer-Aided Learning, "Aiding the Handicapped"

NRC, Newsletter, Associate Committee on Instructional Technology

cont'd...

PROCEEDINGS Cont'd.

A.M. Hlady, A Disc-Based Multiple Terminal Display System

NRC, A Functional Specification for a Programming Language for Computer Aided Learning Applications

J.W. Brahan, A.M. Hlady and J. Humphries, An Experimental Plasma Display Terminal

Next Meeting: ADCIS Winter Conference, January 26 - January 29, 1976, Santa Barbara, California

Ernst Goetze

CASE STUDY - UNIVERSITY OF TORONTO COMPUTER CENTRE OPERATIONS ORGANIZATION

Editor's Note: The following article summarizes the speech presented by the UTCC Services Manager, Stan Yagi, at the SHARE XLV Conference.

Features of the current organization of the University of Toronto Computer Centre include:

- A single system image
- Standard Operating Systems
- Decentralization of access
- Local Computing Co-ordinators
- Some specialized local hardware
- Geographic centralization of CPU's and Operational staff

As a result of new budget allocation procedures at the University of Toronto, UTCC must operate in a 'service bureau environment' i.e. our operating budget is dependent upon the sale of our services.

Previously, UTCC's organization was developed around product lines or the separate host machines. Each product group had their own hardware, developed their own software, provided their own staff, etc. This organization provided an efficient service and allowed for a close interface with users and development staff.

However, the new objective of 'breaking even' by selling our services necessitated a more streamlined and co-ordinated organization. As a result, an organization was developed with the features mentioned above.

This organization can be described as having an 'inner ring' and an 'outer ring'. The 'inner ring' is a consolidation of the hardware operations and systems software responsibility while the 'outer ring' represents the terminals, application software and user information services. The 'outer ring' interfaces directly with the UTCC users. The essential difference between this and the usual Computer Centre organization is the inclusion in the 'outer ring' of the I/O services (i.e. terminals).

The 'inner ring' or Operations Group provides the 'wholesale' computer services while the 'outer ring' or Services Group acts as 'retailers' of the computer services through the various terminal sites or 'corner stores'.

Each terminal site can be likened to a 'corner store'. The combination of the wholesale/retail approach and the 'corner store' concept (convenience computing) results in a more personalized approach to delivering computer services. This approach also promotes a 'single system' image.

cont'd...

CASE STUDY Cont'd.

In conclusion, UTCC has found this organizational structure to be very effective in our current environment.

Stan Yagi

INSTALLATION MARKETING AT THE UNIVERSITY OF TORONTO COMPUTER CENTRE

The following is a summary of the paper presented by Mr. Dave Scobie, Supervisor, Marketing Services, at the recent SHARE Conference.

Mr. Scobie introduced his topic, 'Installation Marketing at the University of Toronto Computer Centre', by pointing out that he was not going to outline how marketing should be done in a university environment, but was simply going to describe how the University of Toronto Computer Centre went about forming, implementing and monitoring the marketing effort. The first step was to get committment from management that marketing effort was in fact necessary. This was relatively easy since it was evident that there was a tremendous need for more revenue in order to supply top level products and services to the Centre's customers and to show UTCC customers that computing was a necessary and cost effective way of increasing productivity and solving problems.

UTCC's customer group is segmented into 6 basic sectors - Administrative, Educational, Research, Commerical, Other and Universities. Each Marketing representative has been assigned a territory which consists of customers in one or all of these market segments. The marketing representative calls on all existing customers within his territory to ensure that they are getting adequate service and to solve customer problems through the use of computing facilities. This has proved to be quite successsful. Customers are pleased that there is someone coming out to speak with them, and to provide them with solutions to their problems in a cost effective manner. On the other hand, Marketing representatives come back with many customer-generated suggestions for new products and services, both software and hardware. The Marketing Services group can then analyze the demand for a particular product or service and thereby recommend to UTCC's technical staff that a new product which will aid our customers be evaluated from the technical perspective. New product development can also be initiated in the opposite direction. Technical staff may provide the Marketing group with suggestions for new products or services which, in turn, Marketing representatives carry to customers for user evaluation.

The marketing effort at the University of Toronto Computer Centre has been extremely effective. A Contract Programming group has recently been formed consisting of 6 application programmers and analysts to handle the workload being generated by Marketing for custom program contracts.

UTCC is currently becoming involved in long range marketing planning, long range marketing training for personnel and a continuing effort to arrive at an optimum organization within the marketing sub-structure which will ensure effective customer support.

RECENT ACQUISITIONS IN THE DEPARTMENT OF COMPUTER SCIENCE LIBRARY

Advances in Computers.
Vol. 13 (1975)

Auerbach Publishers.
Auerbach on Minicomputers, 1st ed.
New York, Petrocelli Books, 1974.

Chu, Wesley W.
Advances in Computer Communications.
Dedham, Mass., Artech House, 1974.

Date, C.J.
An Introduction to Database Systems.
Reading, Mass., Addison-Wesley, 1975.

Gaver, Donald P. and Thompson, G.L.
Programming and Probability Models in Operations Research.
Monterey, Cal., Brooks/Cole Pub. Co., 1973.

Greenberger, Martin, ed., et al.
Networks for Research and Education: Sharing Computer and Information Resources Nationwide.
Cambridge, Mass., M.I.T. Press, 1974.

Hellerman, Herbert, and Conroy, T.F.
Computer System Performance.
New York, McGraw-Hill, 1975.

Hume, J.N.P. and Holt, R.C.
Structured Programming Using PL/1 and SP/k.
Reston, Va., Reston Publishing Co. Inc., 1975.

Korfhage, Robert R.
Discrete Computational Structures.
New York, Academic Press, 1974.

K79, Shan Sun.
Assembler Language for FORTRAN, COBOL, and PL/1 Programmers (IBM 370/360).
Reading, Mass., Addison-Wesley, 1974.

Lint, Jacobus Hendricus van.
Combinatorial Theory Seminar.
Berlin, Springer-Verlag, 1974.

National Computer Conference and Convention.
Conference Proceedings. V.44 (1975)

Scott, Melvin R.
Invariant Imbedding and Its Applications to Ordinary Differential Equations.
Reading, Mass., Addison-Wesley, 1973.

Smillie, Keith W.
APL/360 with Statistical Applications.
Reading, Mass., Addison-Wesley, 1974.

TRW Symposium on Reliable, Cost-effective, Secure Software, Los Angeles, March 1974.
Proceedings.
Redondo Beach, Cal., TRW Systems Group, 1974.

Wichmann, B.A.
ALGOL 60 Compilation and Assessment.
London, Academic Press, 1973.

HOURS OF SERVICE -- THANKSGIVING WEEKEND

The following hours of service will be in effect during the Thanksgiving Weekend for:

S/370-165-II USERS

	October 11 (Saturday)	October 12 (Sunday)	October 13 (Monday)
SF112	10 am-6 pm	10 am-6 pm	closed
EUT	10 am-6 pm	10 am-6 pm	closed
ASUT	10 am-6 pm	10 am-6 pm	closed
AST	10 am-6 pm	10 am-6 pm	closed

S/360-65 USERS

	9 am-5 pm	9 am-5 pm	unattended

CRF USERS

OPEN TO KEY HOLDERS

Regular hours of service for all systems will resume Tuesday, October 14, 1975.

EISPAC, RELEASE II CERTIFIED

Release II of the Argonne Matrix Package EISPACK has been certified and is available to GPJS users. EISPACK contains 70 FORTRAN subroutines to solve eigen problems for complex general, general real, and real symmetric matrices. It also solves the linear generalized eigen-problem, singular value decomposition, and linear equations, where the matrix has a band structure. Different options are available, such as determining the eigenvalues of a symmetric matrix in a certain range, with or without the corresponding eigenvectors, or determining selected eigenvectors of a general complex, or real general matrix, after the eigenvalues have been determined. Besides the 70 FORTRAN subroutines, a control program, EISPAC, is available which makes it possible to solve the eigen problem with different options by a single call statement. Complete documentation of every subroutine with flowcharts for the different eigen problems is available in the Information Office, Sandford Fleming Building, Room 128.

The University of Toronto has been one of the test sites testing and certifying EISPACK. Users with eigen problems should contact the test site representative with their problems in order to save time and money and also to gain a deeper understanding of the numerical techniques employed. The test site representative is Mr. Imre Farkas, Room 1208, McLennan Physical Laboratories, 928-8747.

The EISPACK routines are accessed by attaching the library APPL.ARGONLIB to the SYSLIB DD card for the linkage editor or loader step of a FORTRAN job. For UTCC catalogued procedures (FORTLE, FORTLEGO, FORTGO), code 'IX=APPL,LIBRARY=ARGONLIB' on the EXEC card. In addition, when using the control program, EISPAC, the following card must be added to the GO step for dynamic loading:

```
//GO.EISPACLB DD DISP=SHR,DSN=APPL.ARGONLIB
```

Imre Farkas
John Roth

NEW JOB CLASS ON S/370-165-II

On Monday, October 6, UTCC will be introducing a new job class (called class C) on the S/370-165-II. The purpose of this class is to provide a low level batch access mechanism with no turnaround guarantees at an overall price savings to the user, compared to the identical job run in the standard classes. It represents an intent on UTCC's part to make CPU resources available that would otherwise be idle after class A and B activity has quiesced.

Jobs submitted to this class will be run through a single initiator stream beginning sometime after midnight on weekdays and ending at or before 6 a.m. This class will be run truly at UTCC's convenience with no guarantees to run it on any given night shift or for any total number of hours per shift. In return, UTCC will not charge for CPU time used by these jobs. All other resources and allocations will be charged at standard rates from the price schedule with priority 4 service factor adjustment.

Cont'd...

NEW JOB CLASS Cont'd.

Because this is a class designed to utilize only idle time, there is a small probability that service in this class could be suspended on any given evening (after class C has begun) as a result of new class A/B backlogs. Should this happen, any class C job in execution may be cancelled with no credit granted for charges accumulated to that point. Similarly, should a class C job in execution fail to complete by the end of the shift it will be cancelled with no credit granted. Users of this class should therefore supply their own checkpoint facilities sufficient to resubmit from where the job ended. It is anticipated that these situations will be very infrequent, but UTCC reserves the right to take this action whenever necessary.

The criteria for submission to this class are as follows:

≤ 2 hours ERT
≤ 250 K region size
≤ 2 9 track tape drives

All other peripheral device allocations are available as in class B. Note that the 2-hour limit is software controlled, and jobs requesting more than this amount will be flushed. The usual rules for supplying SETUP cards apply. Users may use any input facility available to them to submit their jobs.

There is no priority structure available in this class. Jobs are queued and executed strictly on a FIFO basis.

In summary, a few words of caution bear repeating.

- Jobs must strictly adhere to the resource rules of the class.
- Jobs are eligible for cancellation because of standard class load fluctuations or end-of-shift without credit.
- Turnaround is truly at UTCC's convenience with no promises or guarantees implied.

It is anticipated that this service will have its greatest appeal to research users who have significantly high CPU demands relative to other resource needs and can be satisfied with the probably lengthy and unpredictable turnaround periods in return for the dollar savings gained. The class is available to all users provided they can fit within the resource restrictions.

Derry Cox

UPDATED VERSION OF COBOL ANSI3 AVAILABLE

Effective since September 19, 1975, an updated version of COBOL ANSI3 has been available on the system. It corrects about 63 problems known in the current default version.

Users are welcome to use and test run the updated version which will become the default one when test runs are satisfactory. To access the updated version:

1. Simply specify LEVEL=ANS36 if UTCC COBOL catalogue procedures are used.
2. Additional JCL cards of the form:

```
//COB.STEPLIB DD DSN=IC.ANS36.COBOL,DISP=SHR
   and
//LE.SYSLIB DD DSN=IC.ANS36.COBLIB,DISP=SHR
```

Cont'd...

UPDATED VERSION Cont'd.

are required in the compile and linkedit steps, respectively.

Users with questions or problems sould contact Kin Fong at 928-6175.

Kin Fong

SUGGESTION FACILITY

As a reminder to old users and as a notice to new users, your attention is drawn to the SUGGEST facility on the High Speed Job Stream. Suggestions, comments or criticisms can easily be communicated to UTCC staff by running a simple job on the HSJS.

```
c
c
1
$JOBR FUNCTION=SUGGEST, NAME="user's"
$ ADDRESS="user's", PHONE="user's"
 Suggestions -- Use columns 1-80
 and as many cards as needed.
```

Users will get a copy of their suggestion on the HSJS printer within a few minutes. Another copy will be printed and filed for UTCC. A UTCC staff member will respond to the suggestion within a few days.

In addition, General Purpose Job Stream users and TSO users may access the ISUGGEST facility by executing the following job:

```
//job card
// EXEC ISUGGEST
//SYSIN DD *
  Suggestion cards (and name, address
  and/or phone if the user wants a reply)
/*
//
```

Note that the job is of minimal expense, usually under 10¢.

Don Gibson

APLSV

The shared variable version of APL (A Programming Language) is now available on the S/370-165-II to users of the University of Toronto Computer Centre.

APLSV accounts may be obtained from the Access Code Clerk in Room 139, Sandford Fleming Building. Documentation is available at the Information Office, Room 128, Sandford Fleming Building.

Associated with APLSV is an interface to OS files called TSIO (Time Sharing Input Output). UTCC has developed some experimental facilities, using TSIO, to perform remote job entry, remote job output and registration of user datasets. UTCC is currently evaluating these facilities and would welcome any comments or suggestions from users. Because these are only experimental or test facilities, documentation is available only from the UTCC APL Co-ordinator:

Mr. Jerry Novak
Room 305
49 St. George Street
928-6387

Jerry Novak

HSJS MONTHLY STATISTICS

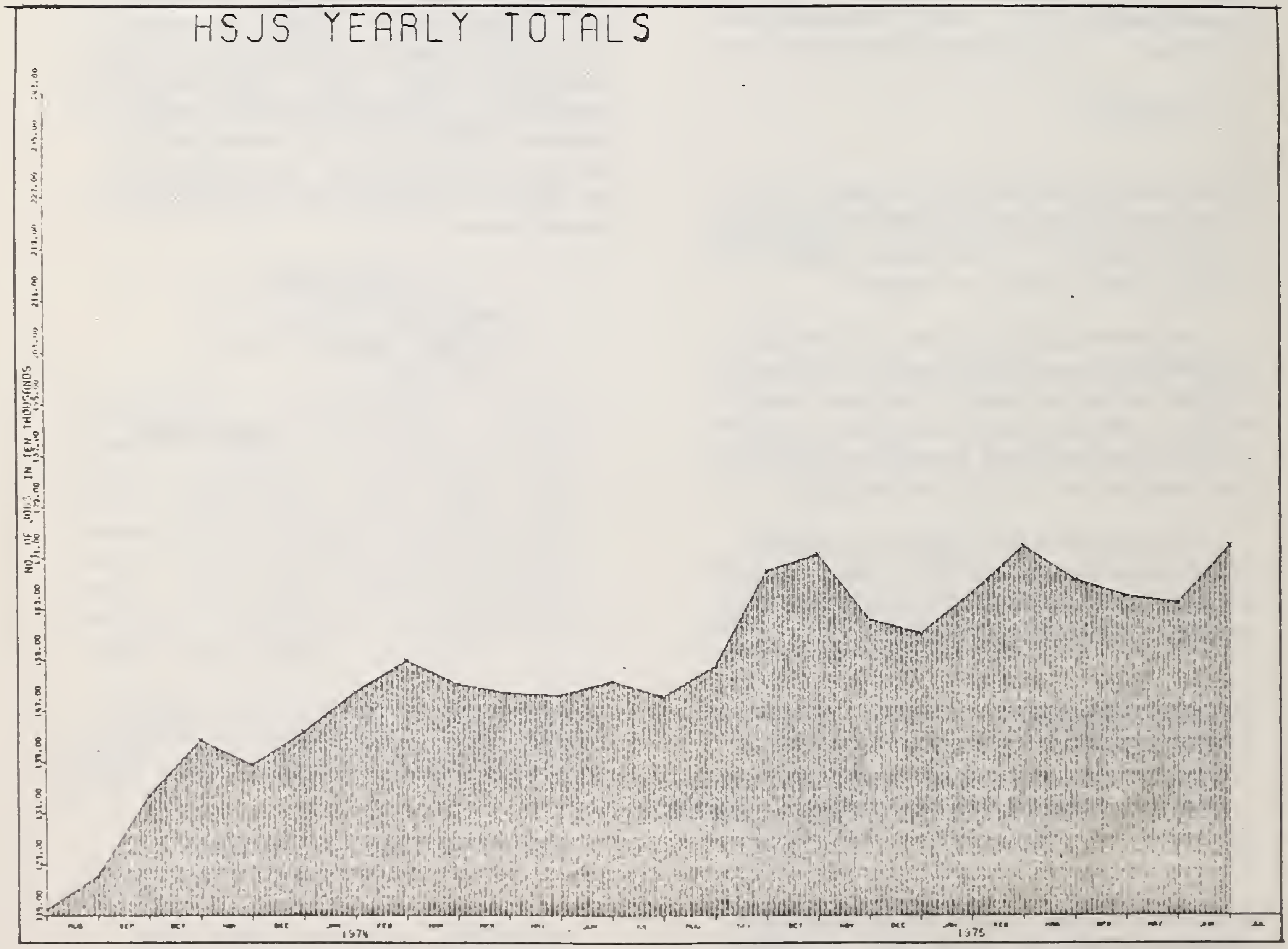
During the month of August, 1975, 51,733 jobs were processsed compared with 32,125 jobs for the previous year (system was down 1 week due to installation of DAT box), an increase of 61%.

The following charts summarize the HSJS activity for the month of August. The graph represents the average number of jobs processed during each half hour period of the day.

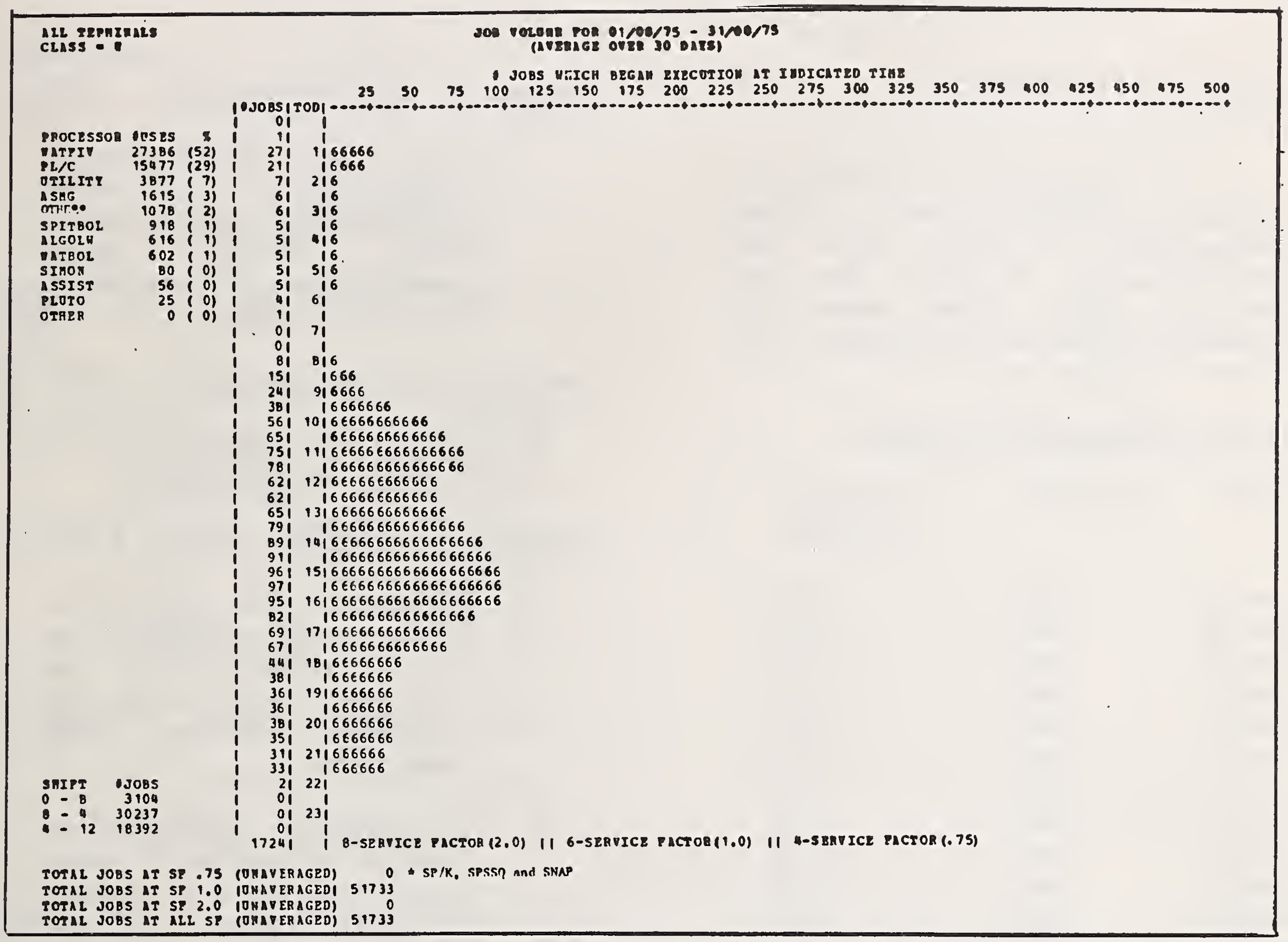
Mark Tapia

The following graph shows the number of HSJS jobs run in each of the twelve month periods, ending with the month shown. This method of representing the moving totals, smooths the irregularities in month to month usage and shows general or yearly trends of usage. Job volume increased from over 1,150,000 jobs in the year ending in August 1974, to over 1,710,000 jobs in the month ending in July 1975.

Mark Tapia



The origin of the above graph starts in August, 1974 with 1,150,000 jobs.



```
ALL TERMINALS                                                 JOB VOLUME FOR 01/08/75 - 31/08/75
CLASS = 0                                                          (AVERAGE OVER 30 DAYS)

                                                           # JOBS WHICH BEGAN EXECUTION AT INDICATED TIME
                                        25   50   75  100  125  150  175  200  225  250  275  300  325  350  375  400  425  450  475  500
                          |#JOBS|TOD|----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                          |    0|   |
PROCESSOR #USES   %       |    1|   |
WATFIV    27386 (52)      |   27|  1|66666
PL/C      15477 (29)      |   21|   |6666
UTILITY    3877 ( 7)      |    7|  2|6
ASMG       1615 ( 3)      |    6|   |6
OTHER*     1078 ( 2)      |    6|  3|6
SPITBOL     918 ( 1)      |    5|   |6
ALGOLW      616 ( 1)      |    5|  4|6
WATBOL      602 ( 1)      |    5|   |6
SIMON        80 ( 0)      |    5|  5|6
ASSIST       56 ( 0)      |    5|   |6
PLUTO        25 ( 0)      |    4|  6|
OTHER         0 ( 0)      |    1|   |
                          |    0|  7|
                          |    0|   |
                          |    8|  8|6
                          |   15|   |666
                          |   24|  9|6666
                          |   38|   |6666666
                          |   56| 10|66666666666
                          |   65|   |6666666666666
                          |   75| 11|666666666666666
                          |   78|   |666666666666666
                          |   62| 12|666666666666
                          |   62|   |666666666666
                          |   65| 13|6666666666666
                          |   79|   |666666666666666
                          |   89| 14|66666666666666666
                          |   91|   |666666666666666666
                          |   96| 15|6666666666666666666
                          |   97|   |6666666666666666666
                          |   95| 16|6666666666666666666
                          |   82|   |6666666666666666
                          |   69| 17|6666666666666
                          |   67|   |6666666666666
                          |   44| 18|66666666
                          |   38|   |6666666
                          |   36| 19|6666666
                          |   36|   |6666666
                          |   38| 20|6666666
                          |   35|   |6666666
                          |   31| 21|666666
                          |   33|   |666666
SHIFT   #JOBS             |    2| 22|
0 - 8    3104             |    0|   |
8 - 4   30237             |    0| 23|
4 - 12  18392             |    0|   |
                           1724|   | 8-SERVICE FACTOR(2.0) || 6-SERVICE FACTOR(1.0) || 4-SERVICE FACTOR(.75)

TOTAL JOBS AT SF .75 (UNAVERAGED)      0  * SP/K, SPSSQ and SNAP
TOTAL JOBS AT SF 1.0 |UNAVERAGED|  51733
TOTAL JOBS AT SF 2.0 |UNAVERAGED)      0
TOTAL JOBS AT ALL SF (UNAVERAGED)  51733
```

RESOURCE USAGE BY PROCESSOR

PROCESSOR	#USES	%TOTAL	TOTAL PER PROCESSOR			AVERAGE PER USE		
			CPU (MIN)	#CARDS READ	#LINES PRINTED	CPU (MIN)	#CARDS READ	#LINES PRINTED
WATFIV	27386	(53)	572.84	8271039	6938689	0.020	300	252
PL/C	15477	(30)	253.85	2459813	4258698	0.016	156	272
UTILITY	3877	(7)	12.38	634958	776506	0.000	160	200
ASMG	1615	(3)	22.36	261919	250943	0.012	160	152
OTHER*	1078	(2)	14.98	187706	176284	0.012	172	160
SPITBOL	918	(2)	10.75	331766	236970	0.008	360	256
ALGOLW	616	(1)	17.89	144473	123743	0.027	232	200
WATBOL	602	(1)	9.08	182777	159127	0.012	300	264
SIMON	80	(0)	0.36	6149	7140	0.004	76	88
ASSIST	56	(0)	0.57	10728	16819	0.008	188	300
PLUTO	25	(0)	0.20	2346	3425	0.004	92	136
LISP	3	(0)	0.01	103	338	0.004	32	112
TOTAL	51733		915.25	12493777	12948682	0.018	241	250

* SP/K, SPSSQ and SNAP

S/370-165-II RELIABILITY

The reliability statistics for August indicate an uptime percentage of 97.6 while the average number of IPL's per day reached 0.83. The number of scheduled hours of production for August totalled 445.

MONTHLY COMPARATIVE FIGURES

MONTH	% UPTIME	UNSCHED. IPLs/DAY
Jan/74	97.0	1.37
Feb/74	98.3	1.25
Mar/74	98.7	1.06
Apr/74	99.3	0.52
May/74	99.2	0.87
Jun/74	96.1	0.75
Jul/74	91.7	1.66
Aug/74	98.3	0.86
Sep/74	94.5	1.83
Oct/74	98.6	1.07
Nov/74	98.9	0.93
Dec/74	97.1	1.21
Jan/75	95.7	2.77
Feb/75	96.0	1.14
Mar/75	96.7	1.10
Apr/75	98.6	0.70
May/75	99.4	0.60
Jun/75	97.4	0.79
Jul/75	95.2	1.23
Aug/75	97.6	0.83

The percentage breakdown of total system downtime for August was:

Hardware: 505 minutes (61.1%)
Software: 67 minutes (8.1%)
Other : 255 minutes (30.8%)

The major events contributing to these downtime totals were as follows:

August 1 - 193 minutes down - 1 IPL

a. All time attributed to corrective air-conditioning maintenance. The machine room temperature had reached a high of 73 degrees.

August 3 - 21 minutes down - 1 IPL

a. All time charged to an IGF002W machine check.

August 5 - 37 minutes down - 3 IPLs

a. 10 minutes due to late IPL while operator powered up the system after an automatic shutdown due to excessive machine room temperature.

b. 27 minutes attributed to double bit errors in Itel memory which were causing A05 wait states. A bad card was replaced.

August 6 - 161 minutes down - 4 IPLs

a. All time charged to double bit errors in Itel memory. System was run with only two megabytes online for a period of three hours. A bad card was replaced.

August 8 - 32 minutes down - 1 IPL

a. All time due to system power down when city water was turned off by maintenance workers. A temperature high of 95 degrees was reached in the CPU water.

Cont'd...

RELIABILITY Cont'd.

August 9 - 62 minutes down - 2 IPLs

a. All time due to double bit errors in Itel memory. A bad card was replaced.

August 10 - 106 minutes down - 0 IPLs

a. A re-occurrence of double bit errors required additional corrective maintenance. For the two days of memory problems, the /165 system was run with only two megabytes online for a period of nine hours.

August 27 - 78 minutes down - 1 IPL

a. All time due to double bit hits in Itel memory. A bad card was replaced.

August 30 - 47 minutes down - 2 IPLs

a. A supervisor loop caused by a control unit check on channel 4 required Itel maintenance. The/165 system was run on channel 3 only for a period of 2 hours. Diagnostics cleared the problem.

Paul Scarborough

```
                             _S/370__DOWNTIMES_DURING_AUG_75


------------------------------------------------------------------------------------------------------------------------
|                                                TIME OF DAY (HOURS)                                                   |
|  DAY  RELOADS DNTIME  0   1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16  17  18  19  20  21  22  23  24|
========================+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| F  1      1     193   |    I      HHHHHHHHHHHHH
| S  2      0       6   |                                        I
| S  3      1      21   |                                        I                    H
| M  4  (CENTER CLOSED) |
| T  5      3      37   |    I HH            H
| W  6      4     161   |                                HHHHHHH         HHHH      S O
| T  7      0       0   |
| F  8      1      10   |      U
| S  9      2      27   |                                          HHH
| S 10      0       0   |
| M 11      1       6   |           S
| T 12      0       0   |
| W 13      2      11   |                                          H          S
| T 14      1       8   |                                I S
| F 15      0       0   |
| S 16      0       0   |
| S 17      0       0   |
| M 18      0       0   |
| T 19      0       0   |
| W 20      1       7   |                                                                   S
| T 21      0       0   |
| F 22      2      15   |                                                S             S
| S 23      1       5   |                                                S
| S 24      0       0   |
| M 25      1      10   |                                                       S
| T 26      1       8   |                                                                                H
| W 27      1      78   |                                 HHHHHH
| T 28      0       0   |
| F 29      0       0   |
| S 30      2      47   |                                                                HHH  H
| S 31      0       0   |
------------------------------------------------------------------------------------------------------------------------
LEGEND :     H FOR HARDWARE
             S FOR SOFTWARE                    STATISTICS
             O FOR OPERATIONAL
             U FOR UNEXPLAINED
             I FOR LATE IPL
                                           TOTAL SCHEDULED HOURS OF PRODUCTION :  445
                                           TOTAL DOWNTIME (MN)   :  650 , AVG/DAY :  21.67 , AVG/PROD HOUR :   0.73
                                           TOTAL REIPL'S         :   25 , AVG/DAY :   0.83
                                           DOWNTIME RATE IS      :  2.44 PERCENT OF SCHEDULED PRODUCTION HOURS
```

```
                         DOWNTIME_REPORT_ON___S/370__FOR_AUG_75


----------------------------------------------------------------------------------------------------------------------------------
|                                                    REIPLS(RECS) // DOWNTIME (MN)                                               |
| DAY  REIPL   DNTIME   0    5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95   100|
========================+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
| F  1      1     193   |☐************************************************************************************************ 193 |
| S  2      0       6   |******
| S  3      1      21   |☐********************
| M  4  (CENTER CLOSED) |
| T  5      3      37   |☐☐☐**********************************
| W  6      4     161   |☐☐☐☐********************************************************************************************* 161 |
| T  7      0       0   |
| F  8      1      10   |☐*********
| S  9      2      27   |☐☐*************************
| S 10      0       0   |
| M 11      1       6   |☐*****
| T 12      0       0   |
| W 13      2      11   |☐☐*********
| T 14      1       8   |☐*******
| F 15      0       0   |
| S 16      0       0   |
| S 17      0       0   |
| M 18      0       0   |
| T 19      0       0   |
| W 20      1       7   |☐******
| T 21      0       0   |
| F 22      2      15   |☐☐*************
| S 23      1       5   |☐****
| S 24      0       0   |
| M 25      1      10   |☐*********
| T 26      1       8   |☐*******
| W 27      1      78   |☐*****************************************************************************
| T 28      0       0   |
| F 29      0       0   |
| S 30      2      47   |☐☐*********************************************
| S 31      0       0   |
----------------------------------------------------------------------------------------------------------------------------------


 LEGEND     : ONE ☐  =ONE REIPL
              ONE *  =ONE MINUTE OF DOWNTIME
```

INTERACTIVE SYSTEMS RELIABILITY

The uptimes achieved for the month of August for each of APL and ATS were 99.68% and 99.47% of scheduled operation, respectively. The scheduled hours of operation during the month of August totalled 470, while the number of unscheduled IPL's per day was 0.07. In addition to the scheduled time, Interactive Services were also available for approximately 92 hours of unattended weekend operation.

The percentage breakdown of total system downtime for August was: Hardware - 38 minutes (74.51%); Software - 13 minutes (25.49%). Two unscheduled IPL's were required as a result of the failures. The major events contributing to downtime were as follows:

August 11, 18, 25: Extended system maintenance in ATS Rollout/Rollin and APL file dump/restore, overlapped into normal production hours.

August 26: A software error in the APL timer caused system response to degrade and eventually abended thus necessitating a re-IPL.

The following table summarizes the time lost out scheduled hours of production due to system failures for each of the systems:

Kam Jain

DATE	DOWNTIME (mins)		REASON
	APL	ATS	
Sun. Aug. 3	-	5	Reset Accounting information
Tue. Aug. 5	6	8	Reloaded 3705
Mon. Aug. 11	-	23	ATS late - rollin
Thu. Aug. 14	8	10	*Data check - APL file restore (HARDWARE)
Mon. Aug. 18	-	7	ATS late - rollin
Thu. Aug. 21	10	-	APL late - file retrieve
Mon. Aug. 25	-	45	ATS late - rollin
Tue. Aug. 26	13	14	*APL slowdown (SOFTWARE)
Total	90	150	*IPL Required

System Failures August 1 - August 31, 1975

APL PUBLIC LIBRARY INFORMATION

Generally, it has been found that accessing the APL public libraries on Sharp APL has been a frustrating experience, especially for new users of APL.

On-line documentation is available but usually imprecise and more than one user has called to complain about losing his keyed-in data to a conversational computing package.

DATATALK continues to support these libraries because there is a lot of good code in them and with proper access, a broad range of applications are well covered.

If you are having difficulty in using the functions available from the APL public libraries, please give us a call and we'll try to help you through.

New libraries based on the Sharp APL libraries are being developed for APLSV on the 370/165 and eventually, the Sharp APL library system will be rationalized to the standards that are set on APLSV.

Ernst Goetze

DATATALK APL DEMO'S

DATATALK has begun a new series of DATATALK APL Demo's that are intended to illustrate the application of the APL public library programs in fairly concrete problem situations. These demo's are applicable to both systems, Sharp APL on the 360/65 and APLSV on the 370/165, and are available free of charge at the University of Toronto Computer Centre Information Office, Sandford Fleming Building, Room 128.

APL DEMO:	A demonstration of APL for the calculation of descriptive statistics
ABSTRACT:	This brief note gives examples of the application of APL to the calculation of simple descriptive statistics. The examples consist of

Cont'd...

DATATALK APL DEMO'S Cont'd.

- generating random and random normal variates
- calculating descriptive statistics
- calculating frequency distributions and histograms
- calculating correlation coefficients
- performing a T-TEST
- function definition of a CHI-SQUARED statistic
- system commands and format facilities

APL DEMO: COGO, a demonstration of a language designed for the solution of geometric problems in civil engineering

ABSTRACT: COGO is a command language that allows civil engineers to solve geometric problems in a familiar terminology. The examples consist of

- defining a Planar geometric structure
- calculating area
- adding additional structure
- APL system commands

Included is a graphic appendix describing the command language.

DIALOGUE: DATATALK SOLVES MONEY PROBLEMS!

The money game is fun to play and everyone participates sooner or later.

The University of Toronto is finding that there is no faster, more convenient way to check a banker's calculations than to give a call to DATATALK.

DATATALK: Good morning, DATATALK services .....
C: Hi! Ah...$5,000 at 13 1/2 per cent for 5 years and at 10 1/2 per cent for 15 years...how much interest do I really pay?
D: Are you making monthly payments?
C: Well yes, that is, I plan to make monthly payments.

Cont'd...

DATATALK DIALOGUES Cont'd.

D: OK...Then the total interest on $5,000 at 13 1/2 per cent for 5 years...that's 60 payments...amounts to...$1,784.97 in interest.
D: In the other case, at 10 per cent...
C: No, that was 10 1/2 per cent!
D: Oh...it's for 15 years at 10 1/2 per cent...that makes $4,685.66 in interest.
C: OK, thank you. By the way, what are the payments?
D: $113.08 and $53.82 per month.

....

DATATALK: Good morning, DATATALK services ....
C: Hello there, good morning. I want to repay $500 in three equal payments.
C: The interest rate is 9 per cent compounded semi-annually and I don't have to make the first payment for a year. What are the payments?
D: They're $198.25, $198.25 and $198.24.
C: That means that the total interest is...ah...let me see
D: $94.74
C: Ah yes...but he said I could pay $166.67, plus outstanding interest each year.
D: Oh sure, that's a principal plus interest on the outstanding balance scheme...so that the payments would then be $212.69, $197.35 and $182.00, for a total interest cost of $92.04.
C: HM...now that you mention it, I'm not really sure what he said. Would you mind sending those calculations to me...

....

DATATALK: Good morning, DATATALK services ....
C: Hello. I'm repaying a loan on $4,000 and I know that I have to pay $118.31 for 3 1/2 years, every month.
C: What I don't recall is the original interest rate...and I'd like to know how much of the principal is still outstanding in six months, twelve months...and so on?
D: HM...that's not usual, but let me think...I think we can estimate that...

REGISTRATION FOR COMPUTER CENTRE NON-CREDIT SHORT COURSES

NAME ____
(First) (Last)

CAN # IF REQUIRED: ________________

CAN HOLDER'S NAME: ________________

Mailing address **including city or borough**. If you have a university address please use it. (Please be sure that you are known at the address you give -- we have received numerous undeliverable rejects in the past).

____

____

____

____

DEPARTMENT ________________

OR MAJOR COURSE ________ PHONE ________

Please enroll me in (circle number):

C1. Introduction to Computers (SF126)
*C2. Job Control Language (JCL)
*C3. Utilities
*C4. Plotting
*C5. Datasets

*1. Confirmation of course(s) will be sent to the above address along with the room number in which the course will meet.

2. You must be a CAN holder or authorized by a CAN holder to take this course.

Education Schedule
Computer Centre
Room 128
Sir Sandford Fleming Lab.
10 King's College Road
University of Toronto
TORONTO, Ontario
M5S 1A1

UTCC COMPUTER EQUIPMENT

SYSTEM/370 MODEL 165-II

- located in SF103/105/112
- provides General Purpose Job Stream, High Speed Job Stream and TSO services
- 3072K bytes of memory
- 1 drum
- 13 disk drives (3330)
- 8 disk drives (2314)
- 6 magnetic tape drives (4 9-track and 2 7-track)
- 6 display consoles
- 6 printers
- 5 card readers
- 1 card punch
- 8 remote batch terminals
- 1 paper tape reader
- Calcomp plotters (11" and 30")
- Gould plotter (11")
- OS/MVT with HASP

SYSTEM/360 MODEL 65

- located in McLennan Physical Laboratories
- provides Interactive Systems Service
- 1536K bytes of core
- 24 disk drives (2314)
- 3 9-track magnetic tape drives
- 1 printer
- 1 card reader
- 1 card punch
- 140 typewriter terminals
- OS/MVT with APL, ATS and CPS

7094 II

- located in Room 1203 Burton Tower
- 32K words of core
- 1 disk
- 8 magnetic tape drives
- input/output via a 1401 computer

COMPUTER RESEARCH FACILITY

- located in SF207
- DEC GT44 Systems with
  - 1 PDP-11/40 CPU
  - 2 9-track dual density tape drives
  - 1 1000 cpm card reader
  - VT17 graphics display unit
  - 1 lab. peripheral system with A/D & D/A
  - 1 CVI 260 Video Bandwidth Compressor
- DEC GT40 System with
  - 1 PDP-11/10 CPU
  - 1 2314 tape disk drive
  - 1 VT12 graphic display unit
  - 9-track/800 BPI tape drive
  - 1 Calcomp microfilm plotter

UTCC DIRECTORY

	ROOM	PHONE 928-
DIRECTOR		
John C. Wilson	SF143	6496
ASSOCIATE DIRECTOR		
Al Heyworth	SF116	4936
ADMINISTRATION MANAGER		
Anthony Pieterse	SF137	8948
INFORMATION OFFICE		
General Inquiries	SF128	4990 or 4991
Don Gibson	SF128A	
MANAGER, SERVICES		
Stan Yagi	SG200	7331
SUPERVISOR, MARKETING SERVICES		
Dave Scobie	SG201	6877
TERMINAL CO-ORDINATORS		
Sandford Fleming Terminal		
Mark Tapia	SF125	7109
Program Advisors	SF117	8599
Erindale		
Vaughan Lawrason		828-5311
Scarborough		
Ralph Lombardi		284-3173
Arts and Science		
Marlene Domoney	SS2104	6509
Management Studies		
Paul Roth		4917
MANAGER, APPLICATIONS SUPPORT		
Joyce Walton	SG204	6875
MANAGER, OPERATIONS		
Derry Cox	SF113	7092
MANAGER, SYSTEMS		
Rein Mikkor	SF113	5058
SYSTEM HARDWARE SUPERVISOR		
Eugene Siciunas	SF113	4967
SUPERVISOR, 7094 SERVICES		
William Beasley	NP1207	7094
MANAGER, COMPUTER RESEARCH FACILITY		
Dennis Smith	SF214B	4800
LAB CO-ORDINATOR (CRF)		
Krishna Patnaik	SF207	8858

	ROOM	PHONE
CONTRACT PROGRAMMING		
Dave Scobie	SG201	6877
ACCOUNTS		
Ann DeFazio	SF139	7148
Wynona Stanley	SF139	8702
ACCESS CODES		
Yvonne Bowen	SF139	8703
ASSISTANT MANAGER, INFORMATION SYSTEMS TERMINAL		
George Milo		5040

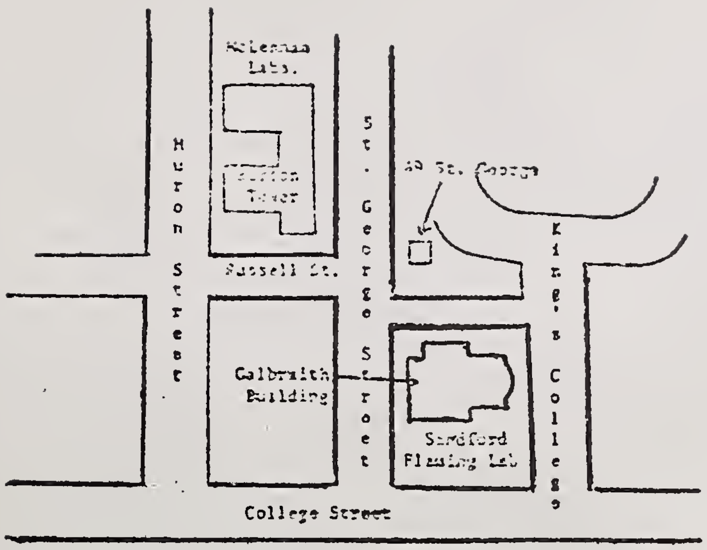
NOTE:

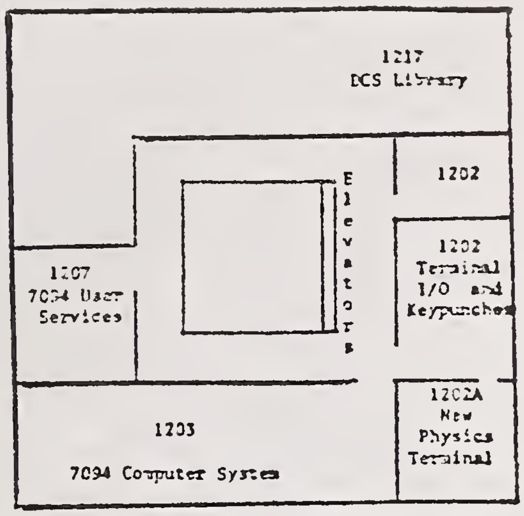
SF = Sandford Fleming
SG = 49 St. George
NP = McLennan Physical (New Physics)
SS = Sydney Smith

JOB AND SYSTEM STATUS QUERIES

SYSTEM/370, TSO	7373
ATS/APL	6234
7094	7094
2741 TERMINAL MALFUNCTIONS	7107
029 KEYPUNCH MALFUNCTIONS	6465

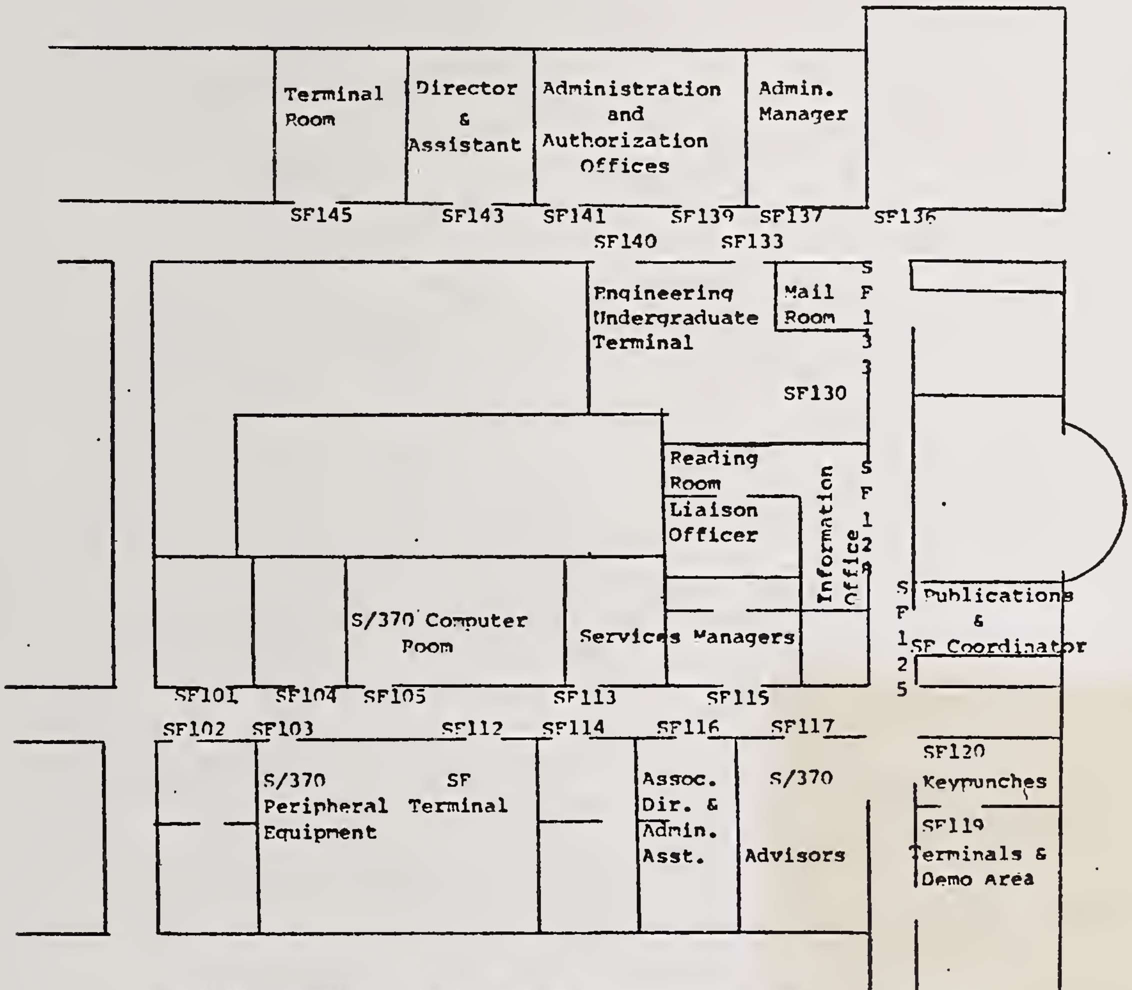
SERVICES	DIAL-UP	ADVISE
APL (2741)	7200	6710
APL (ASCII)	7243	7107
TSO - 2741	7303	8599
TSO - TTY (10 cps)	7390	8599
TSO - TTY (30 cps)	7386	8599
DATATALK	6710	6710



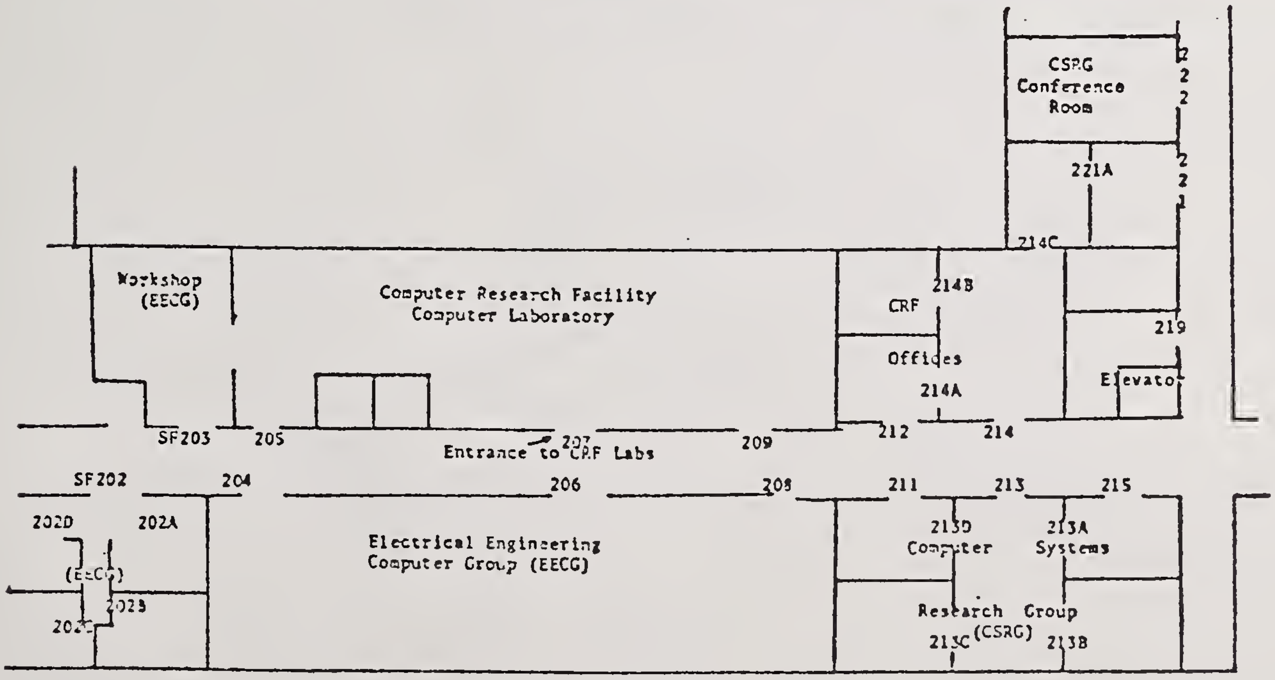


FLOOR PLAN: TWELFTH FLOOR, BURTON TOWER

UNIVERSITY OF TORONTO COMPUTER CENTRE



FLOOR PLAN: FIRST FLOOR, SANDFORD FLEMING LABORATORIES



FLOOR PLAN: SECOND FLOOR, SANDFORD FLEMING LABORATORIES

CAMPUS DELIVERY

DR.J.C.WILSON
DIRECTOR
U T C C
SANDFORD FLEMING BLDG.
ROOM 143
UNIVERSITY OF TORONTO

UNIVERSITY OF TORONTO
COMPUTER CENTRE,
TORONTO, CANADA,